

NASA TECH BRIEF



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Dual-Mode Operation of a Neutron Source, a Concept

A technique has been conceived for operating a pulsed neutron source in conjunction with a photomultiplier tube coupled to a gamma ray scintillation crystal. The purpose of the proposed technique is to allow measurements of gamma radiation resulting from both inelastic scattering and thermal neutron capture. With this technique it should be possible to measure both types of gamma radiation in a single experiment, whereas previous techniques require separate experiments. The combination experiment could find advantageous application in mineral prospecting, geological and geochemical analysis in the logging of an oil well borehole, and oceanographic investigations.

With the proposed technique, during any one source cycle, the pulsed neutron source is operated to produce a short burst of neutrons at low output and then to produce a long burst of neutrons at high output. The photomultiplier tube is turned on during the low-output burst to obtain measurements of gamma rays from inelastic scattering; it is then turned off during

the high-output burst and on again after termination of that burst to enable measurement of thermal-neutron-capture gamma rays. This sequence would be repeated periodically to allow gamma rays from inelastic scattering and thermal neutron capture to be measured in pulsed operation.

Notes:

1. This technique is presented only as a concept. Neither a model nor a prototype of an operational system has been built as of the date of this Tech Brief.
2. No additional documentation is available.

Patent status:

No patent action is contemplated by NASA.

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Mobil Oil Corporation
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1. This document contains technical information of a preliminary nature. It is intended to provide a brief summary of the results of the research and development work performed by NASA and its contractors. It is not intended to be a final report and should not be used as a basis for design or construction without further investigation.

2. SUMMARY OF THE RESEARCH AND DEVELOPMENT WORK

The research and development work described in this document was performed by the NASA Langley Research Center, Hampton, Virginia, under the direction of the Associate Administrator for Research and Development. The work was supported by the Office of Naval Research, Arlington, Virginia, and the Office of Aeronautics, Department of Defense, Washington, D.C.

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